

The Unbearable Heaviness of Being in Phenomenologist AI

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Abstract

The aim of this paper is to pin down the misuse of Heidegger's philosophical insights within the discipline of artificial intelligence (AI) and robotics. In this paper we argue that a central thesis of phenomenology, in Husserl's words, "putting the world between brackets", has led to a positioning in embodied AI that deeply neglects fundamental representational aspects that are totally necessary for the purpose of building a theory of cognition. The unification of representational and being-in-the-world aspects, are necessary for the explanation and realization of complex consciousness phenomenon in a cognizer, both animal and mechanic. The emphasis on the self (post-cognitivists), on the being (phenomenologists), as well as the Being by Heidegger's followers, has contributed interesting insights concerning the puzzle of cognition and consciousness. However, has neglected the necessity and even denied the possibility to provide a scientific theory of cognition.

On the other hand, the phenomenologist's separation of the world into two different ones, the scientific and objective world, and that of our common and lived experience is untenable. The claim that any scientific-theoretical world must find its foundation in the so called live world is ill-founded. In this paper we will propose the basis of a theoretical framework where only one world —with entities and processes— exists and can be known to a certain degree by the cognitive system. This calls for a unified vision of both ontology and epistemology.

1 The Phenomenological Bias

1.1 The object/subject problem revisited

Phenomenology arose out the necessity to surmount the difficulties posed by the dichotomic vision established in Idealist and Materialist philosophies. Apparently, at the core of this dichotomic philosophical approach lurks a paradox pointed out by Husserl: "How is it possible that myself, as a transcendental ego, builds-up the world, being at the same time a human ego inside the world ?". But, where is the paradox? We can't really see it.

The agent is in the world and builds a world of its own, but there is no such paradox. Assuming that for a finite agent it is impossible to give a causal explanation for every fact in the world this is not, in any case, due to a world's opacity to the cognitive capabilities, but to the fact that we are limited cognitive agents inserted in the same reality we want to know. We are part of the world and situated in it. Therefore we can perceive the world only partially.

The world we build and the world we live in are not identical, but closely bound by what Rosen's called the modeling relation (1). This closeness being of evolutionary survival value.

The phenomenologist's approach is obviously excessively biased towards the experiencing agent. This bias has been inherited by robocists and other AI scholars as a reaction to the perceived failures of GOF AI (6). It has been used as a starting point for further development of common-sense centered theories and other naïve conceptions of perception and cognition.

In Husserl's philosophy (3) the object appears as essentially determined by the structure of thinking itself. The world is placed between brackets and the focus is put on the Cogito in the Cartesian's Cogito ergo sum, and objectivity is not longer on the consciousness side.

Husserl pretends to arrive at the essence of things from the experienter¹ point of view. To that end, phenomenology proposes a method called transcendental reduction (epoché) to get to the essence of the objects, hence bracketing the assumption of the existence of an external world. So, access to the real being of the things may only be achieved by the transcendental reduction process grounded in the experiencing self.

The direct economic approach from engineering is necessarily closer to a Humean theory of the self. Hume rejects the object-subject dichotomy, eliminating the self as a knower. Hume's claim, unlike other empiricists like Locke or Berkeley, is in a sense more ontological than epistemological, because he does not have to posit the object of the knower, instead he just describes and analyzes a group of entities called perceptions. The self would be just that succession of related ideas and impressions (perceptions in Hume's words) of which the agent has an intimate memory². This interpretation of the self, as a connected succession of perceptions, will be taken afterwards by other authors (e.g. William James).

1.2 Two kinds of beings for two kinds of worlds

In Husserl's philosophy, a distinction between the world and the everyday world (*Lebenswelt*) is established. This is a logical consequence of his tenets: if the cognitive agent is who *lives* the world depending on the agent's attitude, the world could be configured in a different manner.

Here, there is an implicit criticism to the scientific method. In Husserl's view, the scientific method would be just one attitude, valuable to understand the world explained by physics, but not the correct one to unveil the everyday world (*Lebenswelt*). This claim, that is, the inescapable distinction between the external reality and the reality perceived by the cognitive agent,

¹ Then phenomenology becomes the discipline that investigates the essential nature of the world.

² If we eliminate, as Hume does, the epistemologic concept of knower, we do it too for the antinomy between unknown reality and known reality. Hume erases the transcendence in the cognitive agent, transcendence that by other means will be emphasized in Phenomenology, with the harmful consequences that will be shown next.

animal or robot, has been repeated as a totem by continental philosophers and some AI and roboticist scholars of postmodernist vein.

We fully agree with the analysis that there are different attitudes and that we perceive things, categorize items or infer new sentences, in part motivated and shaped by our current attitude. But the distinction of worlds as a consequence of the attitude, vanishes when we define the concepts in a rigorous manner. Attitudes are structured frames or theories that can be eventually formalized, and might not be confounded with intentionality, which is, as Brentano pointed out, the focus of consciousness.

Intentionality and attention are radically different things, the former is the power of minds to be about or to stand for things, and guiding the behavior, or said à la Dennett “an active engagement with the real world”; and the last is a more complex understanding of objects and process that frames the intentionality of the cognitive agent.

The question about the existence of two worlds —or two thousand worlds— appears promptly. This degeneration³ in the use of the word “worlds”, is in part motivated by the mistake which considers thought and word as the same thing. Obviously language is an important high order cognitive ability, whose fundamental function is to share mental states, that is, as a means to vehiculize, to make one’s thoughts public. However, inferring from that that there is an ontologic equivalence between mental concepts and the words that, denote them, in order to make accessible to the linguistic level, is totally wrong⁴.

The distinction between the world explained by the physics and the everyday world (*Lebenswelt*) does not correspond to any scientific reason but is a sign of obscurantist or at best, lazy thinking. The construction of the everyday world, different to the world of the physics, is not justified. There is only one world, whose entities and process are known to a certain degree, both to scientists and cognitive agents. Our duty as scientists is to explain this world, its phenomenon and entities, by means of laws and causal theories either deterministic or probabilistic or a mixture of both.

2 Heideggerian AI. The being in the world

Husserl’s program is indeed deeply epistemologic, but this is not the case for Heidegger, so keen to many post-modern roboticists. For Heidegger, Ontology is possible only as a kind of Phenomenology. We can obtain the structures of the being only by means of the way they manifest themselves as phenomenon. Heidegger’s is primordialy concerned with the pre-conceptual understanding of Being (*Dasein*) like a protoconsciousness, already socialized. But, explaining consciousness in terms of *Dasein ignotum per ignotius*.

³ Gerald Edelman (12) uses the same term -degenerate- to explain consciousness, “neural groups whose degenerate responses can, by selection accommodate the open-ended richness of environmental input, history, and individual variation”.

⁴ The falsity of the ontological equivalence between thinking and speaking is easily demonstrated: not all the concepts are linguistic concepts. This confusion was exemplary described by *the first Wittgenstein*: “the limits of my language mean the limits of my world”.

Heideggerian philosophy rejects the apparent Cartesian isolation of the epistemological subject. There is never an isolated "I" given without the world, rather any ontology is only conceived as the ontology of a subject. Being-in-the-world is the mode of being a cognitive agent immersed, not just in interactions, but in couplings with surrounding entities.

This metaphysics differentiates two kinds of beings, the readiness-to-hand and unreadiness-to-hand, the former is the being when we are using it and the second, when we contemplate it⁵.

This analysis is fundamentally based in the perceptual and motor interaction with equipments. The habitual example of the hammer, which has two different modes of being -a hammer hammering a nail, or a hammer in a drawer. This offers an extremely basic categorization (maybe that is the reason why it has some followers in AI) that is also extremely limited, because it is focused only on tools. It looks like Heidegger's phobia of technology⁶ gives his system a kind of hand made or medieval touch in his philosophy.

What this approach seems to provide, and to our understanding the central reason for its luring capability, is that it seems to offer an explanation for the apparent failure of GOF AI and a potential alternative to explore in the implementation of cognitive architectures. Agents, Heidegger's followers say, do not need representation, but rather continuous sensory-motor immersion in its reality. The aphorism "the map is not the territory"(13) became the motto of the situated robotics movement⁷. This immersion in the world seemingly offers a solution to the so called frame problem. If the agent uses the world as its own map it is no longer necessary to keep in sync the world and mental representation.

The agent captures reality in the form of patterns (see Figure 2) or in the words of Agre these representations "designate, not a particular object in the world, but rather a role that an object might play in a certain time-extended pattern of interaction between an agent and its environment"(14).

⁵ Another Heideggerian, J.P. Sartre distinguishes between *etre-en-soi* and *etre-pour-soi*

⁶ "When man reveals that which presences, he merely responds to the call of unconcealment even when he contradicts it. Thus when man, investigating, observing, ensnares nature as an area of his own conceiving, he has already been claimed by a way of revealing that challenges him to approach nature as an object of research, until even the object disappears into the objectlessness of standingreserve. Modern technology as an ordering revealing is, then, no merely human doing"(10)

⁷ Curiously enough, some argue for this approach being non-externalist in the sense of Clark cognitive externalism.

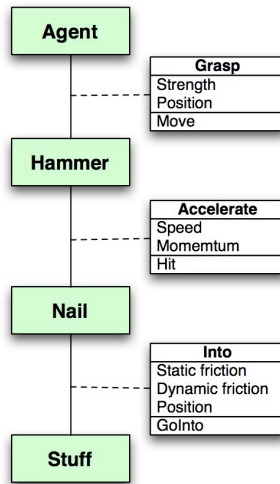


Figure 1: The hammer, the nail and the stuff constitute a pattern.

Of course, this Heideggerian conceptual system for beings is far too simple to give clear responses to other kind of concepts like the abstract or the simulated ones.

The epistemic Husserlian program anticipates the frames theory developed by Minsky with his concept of Noema: a symbolic description of the anticipated features and values of an object, a sort of inner horizon of expectations that permit the structure of incoming data, conforming the context of the object. Heidegger criticizes this enterprise of determining the inner horizon as insufficient to give an account of the context, because the necessary condition to determine it, is to consider as a whole the cultural practises. Therefore, the relevant characteristics which define the context are always already contextualized in a cultural and historical background.

Paraphrasing Heidegger we can say that "[Agents] are already always in a situation". But H.L. Dreyfus—a Berkeley professor and Heideggerian reference in the AI world— claims, in an opposing line, that a robot, even counting on all the possible knowledge it would get from the outside, would not be in any situation, the robot being a decontextualized entity ⁸.

But the Heideggerian analysis of AI is useful in the sense that raises some critical issues concerning the kind of control architecture that a real-world cognitive agent should have—including the representational aspects they would abhor. This analysis does not exclude the possibility to formally describe the situation and hence derive representations for it. Heideggerians opposing representation-based architectures and modular structures go in-

⁸ Heideggerian AI arises out from the frame problem. However it does not provide any solution to the problem, not even any useful insight; but it is a pernicious influence for AI and robotics. Indeed as Dreyfus points out, Heideggerian and positive theories are a *contradictio in terminis*.

deed too far in their analyses of the limitations. For example, their case for coupling vs input/output interactions seem to ignore the trivial fact that any interaction —whether input or output— is indeed bidirectional except in degenerate cases, because the labeling input and output is plainly arbitrary and is in the eye of the beholder.

The thesis defended in this paper is pretty far from this anthropomorphist view. We stress again, that the big mistake is in giving to the mental phenomenon a condition of ontologic difference with respect to the external phenomenon, driving the theorist to ascribe ascientific assumptions and intuitionist theories.

One clear example of this is when Heidegger claims that the mental model of a human of the world is the world itself (cf Korzybski before). Were this the case, any two agents navigating the world would be similarly proficient. But it is obvious that humans, unlike robots or cockroaches, have a mental model of the world that is more acute —ideally isomorphic to a certain extent— that is good enough to permit the human race to survive. We can not say the same of the Heideggerian robots like Brooksonian insects or of Cog, the failed humanoid. But we can say something about cockroaches, their maximal survivability being the reason for the mystifying power of bioinspiration, and it is that in a direct human-cockroach confrontation for an ecological niche all we know what would happen.

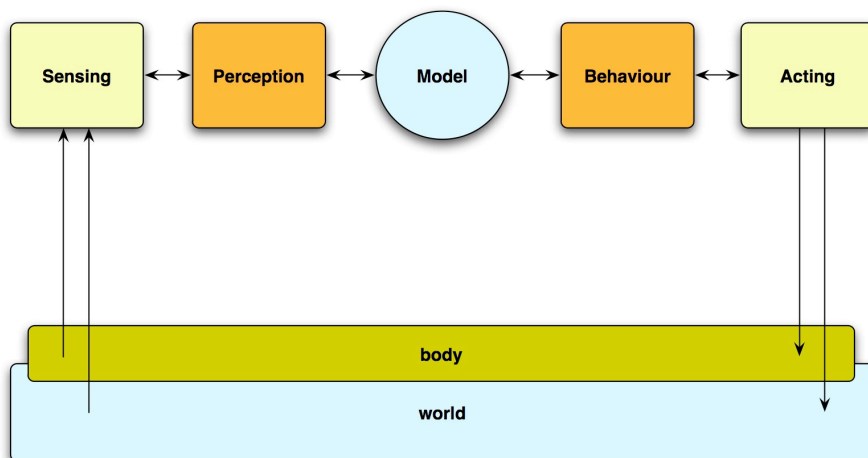


Figure 2: The simple vision of the epistemic —model-based— control loop.

It is a logical absurdity the claim that the mental model of the world of the cognitive agent is the external world; it can be suggestive as a poetic figure, but no scientific model or theory can accept an ontologic falsity as that as a valid proposition⁹. We claim that there is not any unsurmountable obstacle in formally defining a context for the everyday action. The focus must be put in

⁹Heidegger here is totally coherent because Heidegger himself is ascientific.

the theory, which is operating as *cache memory* when we categorize or define concepts, we call this theory Legality. This is done in the context of the realization of an epistemic control loop, where a model of the surrounding world is used by the agent in the performance of its dwelling (See Figure 2).

3 The Embodied Cognition or the Being with Flesh

All these efforts are very valuable but, from our systemic perspective, all these fleshists —Heidegger, Merleau-Ponty, van Gelder, Lakoff, Dreyfus, etc— put too much flesh in the dish of cognition.

Merleau-Ponty (15) gives a sound account that supersedes the dichotomy subject(knower) --object(knowing), formulating the circularity in the perception-action loop. The animal is moved to action in order to acquire and maintain an optimal perceptual grip on what is significant to him in the world¹⁰; in other words, the body evolves in a pathway of permitted states defined by a net of basin of attractors ,which lead the body to move towards an optimal grip.

The introduction by Merleau-Ponty of the body and the perception action loop in his cognitive theory is consistent with the naturalized studies of consciousness, and has set the basis of embodied cognition theories, which are biologically inspired, where the mental phenomena are studied not as personal feelings but as a natural phenomenon. The body (coper) interacts with the environment in such a way as to cope with an environment organized in terms of that organism's need to find its way around.

So for Merleau-Ponty, the body is not just the physical space occupied by the thinking agent, but the necessary instrument to cope best coping with the environment, and to that end, the body moves towards its equilibrium. But once achieved, the coper can not stop there because the environment continues sending solicitations to be interpreted by the coper, in order to get a new best coupling or equilibrium between coper and environment. It is interesting to consider, at this point, the analysis done in neuroscience —and consequently in neuro-inspired robotics— in terms of learning stimulus-response and action-outcome pairs. The question of causality lurks here and is strongly related with Merleau-Ponty's concept of solicitation.

Merleau-Ponty reduces or explains cognition based just on the perceptive process; it looks like the body is the magic key, which explains and obtains all the meanings.¹¹

Van Gelder considers that the external world is too complex to possibly get a representation of it, and argues that it is cognition that enables the agent to cope successfully with the world. "The post-Cartesian agent manages to cope with the world without necessarily representing it. ...the internal operation of

¹⁰ This is also the central tennet of W.T. Powers perceptual control theory (16).

¹¹ Admitting the importance of mirror neurons discovery in motor verbs, we can not construct a global theory of knowledge just with bodily metaphors, flesh is not enough we need the bones, the skeleton! Maybe too much importance is given to the body(11).

a system interacting with an external world can be so subtle and complex as to defy description in representational terms, or in other words, cognition can transcend representation" (17). Obviously this is only true if representations are to be universal and not action-oriented. It is clear that representation complexity can be reduced without much performance sacrifice for concrete tasks. The tradeoff between the complexity of the representation and the competence it offers is resolved in evolutionary economic terms.

Even if van Gelder is using the term cognition in a wider sense as the act of knowing or, as an emergent property of the cognitive agent, representation can not be excluded from cognition, van Gelder eliminates the representational power of the agent in cognition, and puts in its place the notion of coupling. Indeed coupled system performance —e.g. in terms of agent survival— is the result of an isomorphic representation of the world by the agent (more on this later). However, van Gelder suggests that cognition must be untangled from representation except for sophisticated cases involving representation such as breakdowns, problem solving, and abstract thought; but such phenomenon are best understood as emerging from a dynamic substrate, rather than as constituting the basic level of cognitive performance".

But we think that the coupling part in the dynamic information processing, realized by the agent in a dynamic environment, is not the appropriate alternative to the representation of what the Heideggerians call "the everyday world". Van Gelder is missing the point. There is not any justification to separate cognition and representation, both are inherently informational processes or products of such processes; and on the other hand, when he points out that thinking an abstract thought is a phenomenon better understood as emergent, not only he is not saying anything of any value about such a phenomenon but he is also suggesting a sort of emergentist inexplicability.

No matter what the emergent properties are, they must occur following laws, as do all the other phenomena happening in the world¹². Denial of this is pure obscurantism, an attitude incompatible with the scientific stance.

4 A proposal: Systemic-Explanation

When we observe a Heideggerian robot trying to avoid a non trivial obstacle (see for example (20)) we certainly know that this is not what we see from an animal not much more sophisticated than an insect or what we would expect from the machines of the future. Higher animals do have cognitive capabilities that surpass what the *ready-to-hand* and *present-at-hand* ontologies make possible. Deep representations and representation-based behavior engines lie at the core of this capability. For us, something is a representation of another something if it contains/captures some aspect of this second something.

In a sense, the whole issue of anti-representationism seems absurd from our perspective. What a sensor does is re-present in a different value space the

¹² It is quite probable that the so called emergent phenomena is just massive non-linearity, to be explained in the future using theories like nonlinear thermodynamics, chaos theory, etc.

value of a certain magnitude. So, from this perspective, if there is a sensor there is a representation. Elephants don't play chess but they necessarily represent the light in the sky, the water that they drink or the sound of their youngsters.

Beyond the concreteness and atomicity of such representations, can you imagine going back home by means of being-in-the-world?. That would take time, too much time indeed for an evolutionarily viable system.

The impression that we get from the Heideggerians is that they see representation in the simplest GOFAI sense of collections of atomic predicates. Obviously this representation is untenable as a substrate for cognitive behavior in a world for the simple reason that these representations can not represent relevant aspects of the world; fundamentally those related with dynamical-structural aspects of the world.

Heideggerians realize this fact and their reaction is the rejection of the representation as such —and its associated sense of separation between agent and world— to embrace a holistic approach: the agent can't be separated from the world and it must be its own representation. What they should reject is not representation but the kind of representation that is not effective for the particular class of world that the agent is interacting with.

Systems theorists describe systems as a collection of things and a relation between them:

$$S = (T, R)$$

In the system we are interested in, the things T included by the agent and its surrounding reality. Heideggerians aptly see that a collection of representations of the states of the things is not enough to capture the dynamics of the agent-world system. But they fail when they revert into strictly focusing just into the relational aspects R . There is no system without the relation and there is no system without the things. Both parts are necessary to understand the dynamics and hence necessary to master to make a living in that context. While centered on social studies, the article of Mario Bunge (8) is extremely clarifying in this aspect.

So, what a perfect cognitive system must do is to perfectly represent the whole system $S = (T, R)$ in its mind in order to maximize its performance. Obviously, perfection in representation is not possible (this is van Gelder's argument) but thank God it is not necessary for a real agent. What an agent actually needs is a sufficiently good representation of S —we call this a model— to get a sufficiently good outcome from its use. Fortunately, simpler models can be qualitatively equivalent to detailed ones in a certain region of their state space. This is what makes driving cars on roads possible, or the use of computers without being a computer scientist, or what enables cooking without being an histologist, a chemical engineer and perception psychologist at the same time.

Quoting Edward Box we can say "Essentially, all models are wrong, but some are useful". Cognitive agents just exploit useful models. But having a model is not a question of contingency but of necessity. There is no alterna-

tive other than internalizing a model to be effective. As Conant and Ashby demonstrate (19) every good regulator must contain a model of the system it is controlling, or, put into the words of cognitive science, the agent must represent the world to dwell in it. This has strong implications: if an agent is successful in a certain world, it is because it is driven by a model of that world.

This does not mean that we can open the agent and read in its mind, the structure of the world —reading the model— because the model can be collapsed with the perceptual or behavioral systems or with both (see figure fig:epistemic). For example the hammering model of Figure 2 can be collapsed with behavioral subsystem so a hammering order will directly map into the motor action of the agent for a concrete hammer, a particular type of nail and a class of *stuff* to nail the nail into. These embodied realizations of the hammering agent are less effective for a different hammer, different nail or a different *stuff* —the things— for for a different grasp or static friction coefficient of —the relations. But a non-embodied, cognitive agent, can appropriately reason in those circumstances.

We may then question what is the adaptive value of embodiment. The answer is clear and well known in engineering: there are tradeoffs that define families of control structures for the available niches; speed vs cost, robustness vs variety, size vs growth, etc. Embodiment is just an economic, effective solution for certain operational niches.

But we shall remember the fact that embodiment sacrifices behavioral flexibility and that in conditions of no restrictions the pure disembodied agent is maximally performant.

We may wonder what the theoretical substrate is, that enables the construction and exploitation of effective model-based representations. The deep insight is that models do have morphic relations with the modeled. This means that entailments in the modeled —e.g. causal entailments in a physical system— can be mapped into logical entailments in the model, and logical entailments in the model can be mapped back to the modeled system. So we can use the model to reason about the modeled —e.g. to drive part of the world to a certain state or to get some qualia for the agent.

This relation between systems (Figure 4) is called the modeling relation by Rosen (1) and to our understanding captures the very nature of cognition: minds can be put into congruence with the world.

5 Conclusions

Trying to overcome Descartes, the Phenomenologists —from Husserl to Varela passing through Heidegger— have proposed something worse than the Cartesianism, the invention of transcendental entities hardly justifiable in the modern scientific paradigm to give substance to an impoverished relational model of the system composed by an agent and its environment. What Husserl calls the Ego, Heidegger calls the *Dasein*; these are more or less suggestive metaphors or rhetorical pictures insufficient in obtaining a scientific representation of the mental state.

We must strive to find the general conditions of possibility for the mental phenomenon. Naturalizing minds up to the level of consciousness is a long term project but scientifically falsable, technically sound and in any case better than the simple option of the phenomenologists.

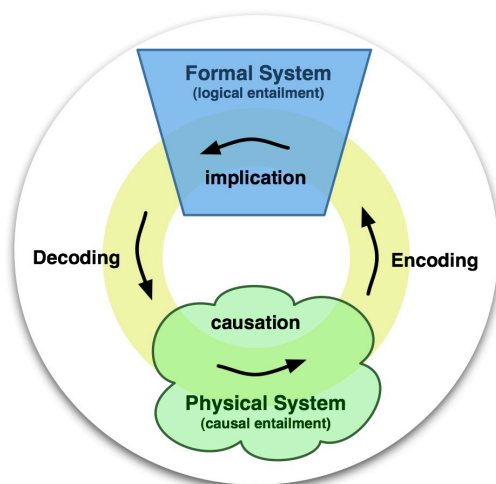


Figure 3: The Rosen's modelling relation captures the basic tenets of cognition as model-based interaction with the world.

Anti-reductionism is usually mislead, and the distinction between ontologic and epistemic reductionism must be known. The first is a reductionism of type "A is B", being A and B predicates (i.e: A neural process is a mental process), and the later is "B is explained in terms of A" (i.e: In a depressive state the concentration of serotonin is low).

The nature is structured in levels, the postulation of the *Dasein* is a consequence of the incapability to appreciate this fact. The everyday world is the same world of the books of physics. Indeed Newtonian mechanics can be written in Einstein equations. It is a question of granularity (norms and theories, the legality in Petitot terms) and not of non-measurability or a-representability. Models do not only have resolution levels but qualitatively hierarchical morphisms. The external world exists independently of the subject and the real processes and entities belonging to the world can be described and explained objectively. On the opposite side of this view are those who claim that there only exist, the appareances perceived by the subject; but even the extreme phenomenist take for granted the reality, independently of what he is observing, he assumes the reality of what he is observing and also the reality and of himself as an observer of the phenomenon. In conclusion, it is impossible to avoid being a realist and it is nonsense to be an anti-representationist. This is how we-are-in-the-world.

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